## 8.5.2 SIEVING AND SAMPLE HANDLING

To provide a better understanding of the environmental fate of inorganic and organic constituents, bottom-material samples collected for chemical analysis are typically sieved to separate them into various targeted particle-size fractions. Sieving of bottom material is known to disrupt chemical equilibrium of the sample.

Study objectives will dictate if sieving or another method of phase separation (such as centrifuge) is used. Data-collection needs will determine the type and construction of equipment, including the type, construction, diameter, and pore size of the sieve. Because sieving can be a labor-intensive process, it is very important to determine, in advance, the mass of sample required for chemical analysis so as not to over or under sieve. The type and quality of equipment used for processing of samples can affect quality of results (section 8.3).

> TECHNICAL NOTE: Any bottom-material samples received by the NWQL need to be pre-sieved through a 2.0-mm or smaller sieve using a minimal volume of native water. Unsieved samples will be sieved (using deionized water) at an additional charge by NWQL, as time permits.

***Use the following procedures for sample sieving and subsampling:***

1. Put on a pair of disposable gloves.
2. Homogenize the composited sample, using appropriate, nonreactive processing equipment:
   a. Decant excess water from sample into an appropriate, nonreactive wash bottle, being careful not to lose fine material.
   b. Visually inspect homogenized composite and record color and texture information in field notes.
3. Select an appropriate, nonreactive sieve or nest of sieves:

   Inorganic constituents.

   - Pre-sieve through a 2.0-mm sieve (minimal requirement for sieved samples).
   - Nest sieves to facilitate sieving process for finer fractions.
   - Use uncolored or white non-metallic sieve and utensils to process bottom material for samples that will be analyzed for metals and metalloids.

- Use a stainless steel, uncolored, or white non-metallic sieve and utensils to process bottom material for samples that will be analyzed for nutrients, major ions, and radioisotopes.

Organic compounds.

- Pre-sieve through a 2.0-mm sieve (minimal requirement for sieved samples).
- Nest sieves to facilitate sieving process for finer fractions.
- Use a stainless steel sieve and stainless-steel or polyfluorocarbon utensils to process bottom material for samples that will be analyzed for organic compounds. Brass is acceptable but not recommended.

4. Wet sieve an aliquot of the composite as follows:
   a. Place an appropriate, nonreactive container under selected sieve or nest of sieves.
   b. Place an aliquot of composite sample on top of sieve(s).
   c. Using a decontaminated squirt bottle, apply a minimal (<100 mL) amount of native water and any supernatant from the composite to remaining material on sieve(s).
      - If native water has a conductivity of greater than 3,000 µS/cm, use deionized water or dry sieve. (Water other than native water may alter ion-exchangeable solute concentrations.)
      - If necessary and without compromising sieve openings, shake sieve(s) from side-to-side to allow passage of material less than or equal to target particle-size fractions through sieve(s). Use an appropriate, nonreactive utensil to gently work target particle-size fractions through sieve(s).
      - At sites with no native water, sieving should be done dry.
   d. When all wash water has passed through the sieve, allow the material in the catchment container to settle.
   e. Decant the supernatant into a wash bottle constructed of appropriate material and continue to reuse the wash water to sieve any additional material until the required amount of material for analysis is obtained.
   f. When the required amount of material is obtained, allow material in catchment container to settle.
      - Allow sufficient time (while at the field site) for most, if not all, material in supernatant to settle.
      - If fine, colloidal, or organic material fails to settle from supernatant, decant supernatant into a separate sample container and take container back to the lab for additional settling time or centrifugation.

- Do not discard supernatant until all fine or organic material has settled from supernatant.

5. Visually inspect >2-mm fraction.

   a. Record information in field notes:
      - Relative volume of >2-mm fraction.
      - Relative volume of organic matter.
      - Relative abundance of shell fragments or other biological material.
      - Relative abundance of grain coatings of red, yellow, and black oxides.

   b. Retain >2-mm fraction for analysis if germane to study objectives; otherwise, discard.

6. If a 63-µm sieve is used, visually inspect >63-µm fraction.

   a. Record information in field notes:
      - Relative volume of >63-µm fraction.
      - Relative volume of organic matter.
      - Relative abundance of grain coatings of red, yellow, and black oxides.
      - Relative abundance of shell fragments or other biological material.

   b. Retain >63-µm fraction for analysis if germane to study objectives; otherwise, discard.

7. If subsamples are needed for several types of analytical requirements, thoroughly mix the sieved material with an appropriate, nonreactive utensil before subdividing into subsamples.

8. Transfer an appropriate amount of subsample to the appropriate sample container. It is recommended that all bottom-material samples be maintained at 4ºC during shipping and until analysis.
   - Inorganic constituents. Use polypropylene container, chill, and maintain at 4ºC.
   - Organic compounds. Use glass container with polyfluorocarbon cap liner, chill, and maintain at 4ºC for shipment; 1-L baked glass bottles are needed for most organic analyses—check with the analyzing laboratory for the appropriate sample containers and sample designations.

9. Place samples on ice immediately after collection and again after processing.